

What is claimed as new and desired to be secured by Letters Patent of the United States is:

1. An imaging system having spatial resolution enhancement comprising:

5 means for providing multispectral bands of images;
a computer connected to said multispectral bands of images for receiving said multispectral bands of images;
means within said computer for resampling-up said multispectral bands of spectral;
means for storing said resampled-up multispectral bands of images; and
means for performing multispectral band-to-band pixel registration of said resampled-up images.

2. The imaging system as recited in Claim 1 wherein said computer comprises a memory for storing said resampled-up, registered images.

3. The imaging system of Claim 1 wherein said means for producing multispectral bands of images comprises a plurality of cameras.

4. The imaging system of Claim 3 wherein each of said plurality of cameras comprises an interline transfer, black and white, progressive scan, CCD video cameras.

5. The imaging system as recited in Claim 3 wherein each of said plurality of cameras comprises 782 x 576 square pixels.

6. The imaging system as recited in Claim 3 wherein said plurality of cameras are optically aligned with a fractional pixel offset to each other.

7. The imaging system as recited in Claim 3 wherein each of said plurality of cameras comprises a narrow band interference filter in front of the lens of each of said plurality of cameras.

8. The imaging system as recited in Claim 7 wherein said narrow band interference filter in front of each of said plurality of cameras comprises user selectable spectral bands within a spectral range covering blue, green, red and near infrared.

9. The imaging system as recited in Claim 1 wherein said means for resampling-up said multispectral bands of images

comprises a routine for performing a neighbor average interpolation.

10. The imaging system as recited in Claim 1 wherein said computer comprises means for acquiring a bracket of computer controlled multiple exposures of said multispectral bands of images for extending dynamic range.

11. An imaging system having spatial resolution enhancement comprising:

a sensor head including a plurality of cameras, each of said cameras having an interchangeable filter producing multispectral bands of images;

a computer for receiving said multispectral bands of images from said plurality of cameras;

said computer comprises means for resampling-up said multispectral bands of images; and

means for performing multispectral band-to-band pixel registration of said resampled-up images.

12. The imaging system as recited in Claim 11 wherein said computer comprises means for storing said resampled-up, registered images.

13. The imaging system as recited in Claim 11 wherein said cameras are optically aligned with a fractional pixel offset to each other.

14. The imaging system as recited in Claim 11 wherein said means for resampling-up said multispectral bands of images comprises a routine for performing a neighbor average interpolation.

15. The imaging system as recited in Claim 11 wherein said sensor head comprises progressive scan, interline transfer, CCD video cameras.

16. The imaging system as recited in Claim 11 wherein each of said plurality of cameras comprises 782 x 576 square pixels.

17. The imaging system as recited in Claim 11 wherein said narrow band interference filter in front of the lens of each of said cameras comprises user selectable spectral bands within a spectral range for blue, green, red, and near infrared.

18. The imaging system as recited in Claim 11 wherein said means for resampling-up said multispectral bands of images comprises a routine for performing a neighbor average interpolation.

5 19. The imaging system as recited in Claim 11 wherein said computer comprises means for acquiring a bracket of computer controlled multiple exposures of said multispectral bands of images for extending dynamic range.

20. A method of providing an imaging system with spatial resolution enhancement comprising the steps of:

providing means for generating multispectral bands of images;
digitizing said multispectral bands of images;
performing a resampling-up operation on said multispectral
15 bands of images in a computer connected to said means for generating multispectral bands of images; and
performing band-to-band pixel registration of said bands of images.

20 21. The method as recited in Claim 20 wherein the method comprises the step of storing said resampled-up, registered images.

22. The method as recited in Claim 20 wherein said step of generating multispectral bands of images comprises the step of using a plurality of interline transfer, black and white, progressive scan, CCD video cameras.

23. The method as recited in Claim 22 wherein said step of using a plurality of cameras comprises the step of optically aligning said cameras with a fractional pixel offset to each other.

24. The method as recited in Claim 22 wherein said step of using a plurality of cameras comprises the step of providing each of said cameras with a narrow band interference filter in front of the lens of each of said cameras.

25. The method as recited in Claim 24 wherein said step of providing each of said cameras with a narrow band interference filter comprises the step of said narrow band interference filter having user selectable spectral bands within a spectral range covering blue, green, red and near infrared.

26. The method as recited in Claim 22 wherein said step of using a plurality of video cameras comprises the step of

providing each of said plurality of cameras with 782 x 576 square pixels.

27. The method as recited in Claim 20 wherein said step of performing a resampling-up operation on said multispectral bands of images comprises the step of performing a neighbor average interpolation routine.

28. The method as recited in Claim 20 wherein said step of performing said resampling-up operation comprises the steps of:

redistributing the sensed data of each of said bands of images by filling odd columns with existing data and even rows/columns with zeros;

calculating an average value of the pixel data at every two adjacent odd columns;

copying said average value into an even column between said adjacent odd columns;

redistributing the sensed data of each of said bands of images by filling odd rows with existing pixel data and even rows with zeros;

calculating an average value of the pixel data at every two adjacent rows; and

copying said average value into an even row between said adjacent odd rows.

29. The method as recited in Claim 20 wherein said step of performing band-to-band pixel registration of said bands of images comprises the step of cropping edges of the bands to produce a 1532 x 1150 x 4 bands format.

30. The method as recited in Claim 20 wherein said method comprises the step of acquiring a bracket of computer controlled multiple exposures of said multispectral bands of images for extending dynamic range.

31. A method of providing an imaging system with spatial resolution enhancement comprising the steps of:

providing a sensor head including a plurality of cameras, each of said cameras having a narrow band interference filter producing multispectral bands of images;

digitizing said multispectral bands of images from said plurality of cameras;

storing said digitized multispectral bands of images;

performing a resampling-up operation on said bands of images; and

performing band-to-band pixel registrations of said bands of images.

32. The method as recited in Claim 31 wherein said method comprises the step of storing said resampled-up, registered images in a memory.

33. The method as recited in Claim 31 wherein said method comprises the step of said cameras being optically aligned with a fractional pixel offset to each other.

34. The method as recited in Claim 31 wherein said step of performing said resampling-up operation on said bands of images comprises the step of performing a neighbor average interpolation.

35. The method as recited in Claim 31 wherein said step of providing a sensor head including a plurality of cameras comprises the step of providing progressive scan, interline transfer, CCD video cameras.

36. The method as recited in Claim 31 wherein said step of providing a sensor head including a plurality of cameras each of said cameras having a narrow band interference filter

comprises the step of said narrow band interference filter having user selectable spectral bands within a spectral range covering blue, green, red and near infrared.

5 37. The method as recited in Claim 31 wherein said step of providing a sensor head including a plurality of cameras comprises the step of providing each of said plurality of cameras with 782 x 576 square pixels.

10 38. The method as recited in Claim 31 wherein said step of performing band-to-band pixel registration of said bands of images comprises the step of cropping edges of the bands to produce a 1532 x 1150 x 4 bands format.

15 39. The method as recited in Claim 31 wherein said step of performing said resampling-up operation comprises the steps of:

redistributing the sensed data of each of said bands of images by filling odd columns with existing data and even rows/columns with zeros;

calculating an average value of the pixel data at every two adjacent odd columns;

20 copying said average value into an even column between said adjacent odd columns;

redistributing the sensed data of each of said bands of images by filling odd rows with existing pixel data and even rows with zeros;

calculating an average value of the pixel data at every two adjacent rows; and

copying said average value into an even row between said adjacent odd rows.

40. The method as recited in Claim 31 wherein said method comprises the step of acquiring a bracket of computer controlled, multiple exposures of said multispectral bands of images for extending dynamic range.